



**United States Patent** [19]  
**Popescu et al.**

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[54] **POTENTIATION OF IMMUNE RESPONSES  
WITH LIPOSOMAL ADJUVANTS**

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**Related U.S. Application Data**

[63] Continuation-in-part of application No. 07/425,727, Oct. 23, 1989, Pat. No. 5,231,112, which is a continuation-in-part of application No. 06/773,429, Sep. 10, 1985, Pat. No. 4,891,208, which is a continuation-in-part of application No. 06/721,630, Apr. 10, 1985, Pat. No. 4,721,612, which is a continuation-in-part of application No. 06/599,691, Apr. 12, 1984, abandoned, and a continuation-in-part of application No. 07/397,777, Aug. 23, 1989, abandoned, which is a continuation-in-part of application No. 07/277,854, Nov. 30, 1989, abandoned, and a continuation-in-part of application No. 07/236,701, Aug. 25, 1988, abandoned, and a continuation-in-part of application No. 07/277,854, Nov. 30, 1988, abandoned, and a continuation-in-part of application No. 07/128,974, Dec. 4, 1987, abandoned, and a continuation-in-part of application No. 07/061,186, Jun. 11, 1987, abandoned, which is a continuation-in-part of application No. 06/934,151, Nov. 24, 1986, abandoned, and a continuation-in-part of application No. 06/873,584, Jun. 12, 1986, abandoned, and a continuation-in-part of application No. 07/236,701, Aug. 25, 1988, abandoned, which is a continuation-in-part of application No. 07/128,974, Dec. 4, 1987, abandoned, and a continuation-in-part of application No. 07/236,702, Aug. 25, 1988, abandoned.

[51] **Int. Cl.<sup>7</sup>** ..... **A61K 9/127**; A61K 39/385; A61K 39/12; B01J 13/02

[52] **U.S. Cl.** ..... **424/450**; 424/812; 424/196.11; 424/204.1; 424/206.1; 424/234.1; 264/4.1

[58] **Field of Search** ..... 424/196.11, 206.1, 424/204.1, 234.1, 265.1, 812, 88, 89, 92, 405; 264/4.1

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[57] **ABSTRACT**

A high integrity liposome comprising at least one stabile lipid and at least one peptide-like therapeutic agent associated with said liposome, adapted for parenteral administration to an animal, including a human, and method according to manufacture and use. Immunizing dosage forms comprising a liposome and an immunogen, wherein said liposome and immunogen are present in an immunization dose. Additionally, a dosage form, including such form particularly adapted to producing an immune response, comprising a salt according to an organic acid derivative of a sterol and an immunogen wherein said organic acid derivative of a sterol and immunogen are present in an immunization dose, and method according to use is disclosed. Further, a dosage form, including such form particularly adapted to producing an immune response, comprising dimyristoylphosphatidylcholine (DMPC)/cholesterol liposomes, optionally in an aluminum hydroxide gel, and an immunogen wherein said DMPC/cholesterol and immunogen are present in an immunization dose, and method according to use.

**16 Claims, No Drawings**